

Structural Group Leadership and Regime Effectiveness

Frank Grundig

University of Kent at Canterbury

Hugh Ward

University of Essex

Usually the provision of international environmental public goods cannot be secured by a single state. Rather, a group of major powers has to pool its resources to provide structural leadership in order to achieve an effective regime. Such a group of pushers uses its structural power to achieve its goal. However, it faces two challenges. First, it may have to overcome the opposition of a group of laggards that desires less environmental protection and may try to counter the pushers' efforts. We hypothesise that the regime will be more effective to the extent to which the pushers predominate over the laggards in terms of structural power. Second, both groups may have to overcome a collective action problem with regard to dispensing costly side-payments. We argue that social capital embedded in inter-state networks may help the groups to overcome such collective action problems. Thus we argue that the regime will be more effective to the extent to which pushers are predominant and also have more social capital than laggards. Empirical results support our hypotheses.

Keywords: structural power; regime effectiveness; social capital; international cooperation; public goods

The question of whether some nation or group of nations can exercise leadership over global environmental issues is a vital one. For instance, in April 2011 Christiana Figueres, Executive Secretary of the United Nations Framework Convention on Climate Change, urged the EU to continue playing a constructive leadership role in climate change negotiations. While the EU has certainly attempted to play such a role (Skjærseth and Wettstad, 2009), political scientists know relatively little about the conditions under which such attempts are likely to succeed. The purpose of this article is to clarify theoretical expectations about leadership and to examine the evidence statistically, not only for global issues like climate change but also for regional environmental issues. Specifically we aim to assess what combination of factors needs to be present for such leadership to help build an effective regime.

Leadership at the international level can take several forms, including leadership by individuals in negotiations, skilled diplomacy and unilateral action to encourage others to reciprocate (Skodvin and Andresen, 2006; Underdal, 1994). Here we are concerned with structural leadership. Potential for structural leadership exists when *i* controls outcomes that are important to *j* to a greater extent than *j* controls outcomes that are important to *i* (Underdal, 1994; Young, 1991). Such an asymmetry may be converted into bargaining leverage so as to facilitate collective action by states in pursuit of common interests (Underdal, 1994; Young, 1991, pp. 287–8). For instance, according to the World Development Movement (2011), the US and UK promised to make available (and threatened to withhold) vitally important aid for adaptation to climate change unless developing countries signed up to the Copenhagen Accord.



In principle structural leadership may be exercised by a hegemonic state acting alone. Yet many of today's environmental problems cannot be resolved by the actions of a single state, as climate change illustrates. Here EU leadership, let alone that of any single state, runs up against strong continuities in US policy across administrations, and against potential leadership challenges from that country (Paterson, 2009). Global environmental action usually requires several powerful states to pool resources if it is to be effective (Young, 1991), though regional action may be led by a single nation. With some exceptions (e.g. Lake, 1993; Norrlof, 2010; Pahre, 1999; Snidal, 1985; Young, 1991), neither the theoretical nor the empirical literature has paid sufficient attention to structural leadership by a group of major nations, justifying our principal focus here.

International action over the environment typically concerns the provision of non-excludable benefits, whether the problem is one of providing a pure public good, maintaining a common-pool resource or controlling externalities. Because of non-excludability some nations may find it rational to free-ride on others' efforts, because they can get benefits even though they do not bear costs themselves. For brevity we refer to public goods to cover all these categories unless we have a specific reason to differentiate them. We argue that while some nations want progress towards increased provision of public goods through building an effective regime, typically others do not. Since broad participation is usually required for an effective regime, it may be necessary for pushers to use their structural power to induce laggards to accept more effective arrangements. Pushers may face opposition, because some laggards also possess structural power. Whether pushers succeed depends on whether they predominate in structural power over those willing to oppose them, but this is not the only factor at work.

Employing structural power is costly. Because it is being deployed to provide non-excludable benefits, nations may be tempted to free-ride on others' use of such power. This means that predominance, alone, is not sufficient. Both pushers and laggards may face collective action problems in deploying their structural power. We argue that the key factor is whether they can trust their allies to deliver on deals. In turn this depends on whether they are well networked with them, so their group has a high level of social capital. On this basis we conclude that pusher predominance leads to a more effective regime to the extent that the pusher coalition also has the advantage of a higher level of social capital than laggards, so it is better organised. When we test our propositions using the International Regime Database (IRD) (Breitmeier *et al.*, 2006) we find that predominance of the pusher coalition in terms of structural power increases regime effectiveness as long as the US is a member of this coalition. Moreover, the combination of predominance and US leadership matters to the extent to which the pusher coalition has greater social capital than the laggards.

Our findings are of significant interest in the light of a number of academic and policy debates. They suggest that no country on its own can increase environmental regime effectiveness, not even the US; but neither can a coalition of pushers do so unless it includes the US. Only when a coalition including the US exercises structural leadership do we find significant effects on regime effectiveness. This has implications for viable policy options in issue areas in which the US remains disengaged, including climate change. More generally our findings contribute to the debates on structural leadership and regime effectiveness. We

develop the theory of structural leadership by a group and to the best of our knowledge we are the first to test the effect of structural group leadership on environmental regime effectiveness using a large-*n* research design. In recent years there has been increasing interest in the international relations literature in the use of social network analysis (Hafner-Burton *et al.*, 2009). We also show how these techniques illuminate the ways in which the distribution of social capital across groups promotes or blocks the provision of environmental public goods.

Structural Leadership and the Role of a Coalition of Leaders

The dominant account of structural leadership in international relations theory is hegemonic stability theory in its various guises. A hegemonic state, which is usually assumed to dominate across various issue areas (e.g. trade, monetary relations, security), will provide a public good either unilaterally or by exercising 'coercive leadership' to make others contribute (Gilpin, 1987; Keohane, 1980; 1984; Kindleberger, 1973; Lake, 1993; Norrlof, 2010; Pahre, 1999; Snidal, 1985). There are many reasons to doubt the explanatory power of hegemonic stability theory (McKeown, 1991; Mansfield, 1992; Norrlof, 2010; Pahre, 1999; Snidal, 1985; Young and Osherenko, 1993). We focus on environmental issues where the hegemon cannot provide the good acting alone and its power is unlikely to be sufficient to coerce others. It is not that structural leadership is irrelevant here. Indeed there is evidence that it is important (Tallberg, 2008), especially when concentrated in the hands of pushers (Breitmeier *et al.*, 2011; Underdal, 2001a). Thus our specific concern is with the articulation of structural power by a coalition of powerful nations and its conversion into bargaining leverage (Skodvin and Andresen, 2006; Underdal, 1994; Young, 1991).¹

Small groups of powerful countries that act together may be able to exercise structural power to increase provision of public goods (Young, 1991, p. 290). These *k*-groups (Snidal, 1985) can provide leadership by supplying the good themselves (e.g. Lake, 1993; Pahre, 1999; Snidal, 1985) or by employing side-payments to get other states to contribute (e.g. Lake, 1993; Norrlof, 2010; Snidal, 1985; Young, 1991), increasing provision of the good when countries' priorities over its provision differ (Barrett, 2003). Side-payments are based on states' control over outcomes important to others (Underdal, 1994), that is, structural power. The term side-payments might seem to invoke straightforward monetary transactions, but side-payments can take many other forms, including the approval of arms deals, the supply of advanced technology, political support in the UN Security Council, security guarantees, developmental aid, support in obtaining loans from the International Monetary Fund (IMF) or the World Bank, etc.² As well as positive rewards, side-payments may also be negative – the withdrawal of something valued.

The literature on group leadership is in need of further development because, to our knowledge, there is no explicit account of competition between different groups or of the collective action problems such groups face when they attempt to 'coordinate their coercive capacities' (Snidal, 1985, p. 603). *K*-group theory refers to a single group which benefits from the provision of the good and is instrumental in providing it for all. Scott Barrett (2003) also assumes that side-payments are employed just by the group that benefits. Yet Oran Young (1991) points out that several coalitions may form and may attempt to block

each other's actions. Employing side-payments may be *collectively* efficient for a group of leaders because this improves public good provision more than the cost in terms of side-payments (Lake, 1993, p. 468), but this does not imply that individual members of the group will find it rational to bear their share of the costs. Coalitions providing side-payments must overcome incentives for their members to free-ride on the actions of their allies. In the next section we develop the theory to deal with these problems, using environmental issues as a motivating example.

Group Leadership and Environmental Regime Effectiveness

International environmental negotiations are usually characterised by parties with divergent and often opposing interests. A state's position depends on how ecologically vulnerable it is, how costly it is for it to address the problem given proposed arrangements under the regime (Sprinz and Vaahtoranta, 1994), and side-effects on its economic competitiveness and ties with allies. States with low vulnerability and high abatement costs may be called 'draggers' or 'laggards', while states with high vulnerability and low costs and little or no other reason to oppose action are 'pushers' in the issue area (Grundig, 2009; Hovi *et al.*, 2009; Sprinz and Vaahtoranta, 1994, p. 81). Second-order reasons for opposing progress may also arise. Domestic special interests, typically industrial lobbies, may be affected by others' implementation of regime provisions; for example, reduction in demand for fossil fuels affects producers in exporting states. There may be costs to competitiveness if others mandate product standards associated with the regime and these reduce a nation's exports (Vogel, 1997). A nation may fear they will be subject to increased pressure to contribute in the future as international advocacy networks generate a 'boomerang effect' empowering domestic environmental lobbies (Keck and Sikkink, 1998). It may also fear foreign policy losses due to going against allies' positions. Case studies suggest that unless laggards' positions change, effective environmental regimes do not result, because they can veto progress (Chasek *et al.*, 2010, pp. 264–9).

We conceive of international environmental negotiations as taking place over a single dimensional issue space. By an effective regime we mean one that helps solve the underlying collective action problem (Underdal, 1992). We discuss this conceptualisation in more detail in the empirical section below. States take up more or less progressive positions in terms of the degree of effectiveness of the regime they desire. Pushers are in favour of a relatively more effective regime while laggards desire a relatively less effective regime. Besides the pushers and laggards there may be a group of states not actively involved in promoting or impeding progress whose concerns may, nevertheless, need to be addressed.

Pushers cannot usually provide an effective regime on their own and will need contributions from other states, including some laggards that do not favour a regime as effective as the pushers want. If the public good is provided by an additive technology of production, which characterises issue areas such as ozone depletion, it may only be feasible for pushers to provide a relatively small amount of the good acting alone (e.g. Barrett, 2007). Other environmental goods are characterised by a 'threshold' technology (Taylor, 1987). An example is climate change, where avoiding crossing dangerous tipping points in the climate system means that total emission reductions must be above a certain level. In cases like this pushers may not be able feasibly to reach such a reduction threshold. The inability of

pushers to go it alone may give some countries a de facto veto over achieving an effective regime which pushers may attempt to buy out using side-payments (Chasek *et al.*, 2010).

The coalition of laggards may also employ its own structural power in an attempt to achieve a less effective regime, in line with its preference. A well-organised coalition of laggards can use its own structural power to attempt to nullify the pushers' structural power. Side-payments by laggards can be used to pay off states to remain non-contributors or to offer only a reduced contribution. It might be objected that laggards would not actively oppose the provision of environmental public goods *by other states*, for they would stand to gain due to non-excludability. However, they may fear a range of second-order effects, as noted above. It may be worth the price of making side-payments to avoid associated costs.

Our first hypothesis follows from these considerations:

H1. The regime will be the more effective the greater the pushers' predominance in structural power over laggards.

Pusher and laggard coalitions must overcome internal collective action problems if they are to mobilise their structural power. Allies may not be certain whether others will reciprocate if they act in the group's interests. If the risk of allies failing to reciprocate is too high, a nation may be deterred from deploying its structural power to the group's benefit. Thus the effectiveness of the pusher and laggard coalitions will be conditioned by the degree of trust that their members have in their allies (Kydd, 2007).

Social capital comprises networks and formal and informal institutions that promote trust, reciprocity and collective action (Coleman, 1994; Ostrom and Ahn, 2008; Siegel, 2009). It has been widely held to be important to successful collective management at the domestic level of environmental commons (Bodin and Crona, 2009; Brondizio *et al.*, 2009) and to sustainable development (Pretty and Ward, 2001), as well as to international cooperation over environmental issues (Ward, 2006), and to whether nations take on international environmental treaty obligations (Bernauer *et al.*, 2010).

In international politics social capital is embedded in networks created through co-affiliation to international intergovernmental organisations (IGOs), bilateral trade flows, alliances and treaties (Dorussen and Ward, 2008; 2010; Hafner-Burton and Montgomery, 2006; Maoz *et al.*, 2006). Dense social networks linking nations foster a high degree of trust because they facilitate exchange of information relevant to judging whether others will reciprocate. Nations would be ill-advised to rely solely on what fellow group members say about their intentions. Rather, they will also seek information from other nations, through their network ties. Failure to reciprocate does more damage to a nation's reputation when information about this propagates easily through networks, so social capital increases the incentives to maintain reputation (Dorussen and Ward, 2008, pp. 192–5). In addition social capital in networks helps foster an appreciation of others' interests, aids socialisation of states into norms of reciprocity and promotes similarity of interests.

We argue that whether social capital promotes regime effectiveness depends on the interaction between the distributions of structural power and social capital (Ishihara and Pascual, 2009). If pushers predominate and are well networked with each other and laggards are relatively poorly networked, the regime will be more effective, because pushers will be able to activate their structural power advantage and laggards will find it harder to mobilise

to resist. But pusher predominance may fail to lead to a more effective regime if pushers do not trust each other but laggards are well networked and can mobilise relatively effectively. So we expect that:

H2. The greater the level of social capital among the pusher coalition compared to the level of social capital among laggards, the greater the effect of pusher predominance.

Empirical Analysis: The Effect of Group Leadership on the Effectiveness of International Environmental Regimes

The key to our empirical analysis is to have measures of effectiveness and whether countries were pushers or laggards for a relatively large number of cases. The IRD (Breitmeier *et al.*, 2006) is unique as far as we know in providing this combination of information. First we discuss the information we draw from this and from other sources.

The Case Structure in the IRD

The International Regime Database (IRD) has a complex case architecture of regimes, components within regimes and particular problems nested within components. For example, within the regime dealing with international trade in endangered species, one regime component is the 1989–93 phase of the Convention on International Trade in Endangered Species (CITES); and within this component, two problems are coded, one relating to protecting endangered species and another to trade in plants and animals. The cases in our analysis are problems, of which there are around 120. The way that problems are nested within regimes suggests that the error structure of statistical models will violate the standard assumptions that errors are independent and identically distributed, a point we return to below.³ For the majority of cases the IRD reports the way in which two different coders answered the same question. In such instances we averaged the scores assigned by the two coders, treating non-responses, don't knows and 'irrelevant' responses as missing data.⁴ A problem with the IRD is that it is not clear what measures were taken to check inter-coder reliability. We return to this point. Around two-thirds of the cases can be considered problems of global concern where any associated legal agreement was in principle open to any nation. However, some concerned regional issues like management of fisheries in the South Pacific and even bilateral problems such as joint management by the US and Canada of water resources in the Great Lakes. Our hypotheses should apply broadly, not just to global problems.

The Dependent Variable

Regime effectiveness has been related to environmental outcomes, attainment of goals set by the countries involved and conformity to regime rules and norms. For us what ultimately matters is whether regimes improve environmental outcomes – whether they help provide public goods by helping solve collective action problems.⁵ Thus we consider a regime to be effective if it has a causal impact on outcomes such that outcomes are better from the perspective of environmental quality than they would have been in the counterfactual situation without a regime (Underdal, 1992). Carsten Helm and Detlef Sprinz (2000) refine this idea to make allowance for economic efficiency, and they conceptualise

the counterfactual as the outcome of a non-cooperative game, but these amendments raise serious issues for operational measurement (Bernauer and Siegfried, 2008). We recognise that effectiveness is a complex, multilayered concept (Hovi *et al.*, 2003; Underdal, 2001b) and that our theory might not apply to other ways of conceiving it.⁶

Our measure of effectiveness is a function of two components: (1) the degree of improvement achieved in the issue area; and (2) the degree to which this improvement was actually caused by the regime. The IRD codes both components: the variable *problem_change* ranges on a five-point scale from 'worsened considerably' to 'improved considerably'. We recoded this variable in such a way that 'no change' is now set at 0 and positive scores mean an improvement and negative scores mean a worsening of the situation. The variable *problem_change_causal* ranges from 'little or no causal impact' to 'very strong influence' on a five-point scale. We obtained our independent variable called *effectiveness* by multiplying these two variables. Thus *effectiveness* has a theoretical range of -10 to +10. The highest score represents a considerable improvement in the issue area with the regime component having a strong causal impact. The lowest score represents a considerable worsening of the situation in the issue area, again with a strong causal impact of the regime component in question. Thus, like Thomas Bernauer and Tobias Siegfried (2008), we allow for the possibility that the regime makes things worse, associated with negative scores. The multiplicative form of our index embodies a trade-off between improvement and causal impact in judging overall effectiveness. So cases that improved slightly but where arrangements had a very strong causal impact are scored the same as components where there was considerable improvement but only a modest causal influence, etc. Descriptive statistics are given for *effectiveness* and for other variables we use in Table 1.⁷ On average *effectiveness* is coded as being relatively low but positive, but negative effectiveness is quite frequent.

Primary Independent Variables

Pusher Predominance. An important part of our argument rests on the distinction between pushers and laggards and on the actions of coalitions of a small number of pushers and laggards. The IRD codes up to six important state actors in the issue area, using a

Table 1: Descriptive Statistics

<i>Variable</i>	<i>n</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
effectiveness	121	1.843	3.697	-10	10
predominance	124	0.056	0.120	-0.216	0.382
known_consequences_options	124	1.638	0.564	1	3
power_setting_tension	124	4.056	0.632	3	6
usa_push	124	0.403	0.492	0	1
usa_lag	124	0.024	0.154	0	1
problem_understand	124	2.637	0.889	1	4
malignancy	120	6.371	1.935	3	11
diff_cap	124	-0.217	3.034	-8.004	7.807

five-point scale. The coding ranges from extreme laggard, through laggard, neutral and pusher, through to extreme pusher.

The ability to block action (Chasek *et al.*, 2010) is an issue-specific form of power that could be relevant to assessing structural leadership. However, our focus is on buying out vetoes on action using side-payments, so states' material capabilities are what we primarily seek to capture, although we return to issue-specific power below when considering robustness of results. We use Composite Index of National Capability (CINC) capacity scores as defined by the Correlates of War Project (<http://www.correlatesofwar.org>) to measure structural power.⁸ These are based on six indicators: military spending, military personnel, energy consumption, iron and steel production, urban population and total population. These proxy structural power better than measures based on GDP because side-payments can take the form of military aid, alliances or support over foreign policy issues where hard power matters. We focus on major powers that are members of the pusher and laggard coalitions since the theory of structural leadership applies to such nations. We consider the US, Russia, United Kingdom, France and China to be the major powers of the post-Second World War world.⁹ The IRD gives the start and finish year of regime components. We took the average value of the CINC scores of each major power listed as being involved on either side of a problem during this period. Then we calculated *predominance*: the sum of the capacities of the major powers listed as an extreme pusher or pusher minus the sum of the capacity scores of major powers listed as a laggard or extreme laggard. As Table 1 suggests, on average pushers predominated, but in many cases the laggard coalition had greater capacity, in which case *predominance* took on a negative value.

US Involvement. The US has been the dominant economic power, provider of reserve currency, financial power, trading nation and military power throughout the time period of this study (Keohane, 1984; Norrlof, 2010). Add to this its geopolitical reach and the dominant position in international organisations such as the IMF and the World Bank. Finally the US also has considerable technological and scientific capacity, and well-developed channels for environmental diplomacy. It is thus clear that the US has structural power beyond what is captured by its CINC score. We argue that if the US was a pusher, the predominance of the pusher coalition would be more likely to make a difference, due to the US' special position.

Typically not all members of the pusher coalition want the same degree of regime effectiveness, and the least progressive member is in a powerful position – especially when it is a hegemonic state like the US. Then the pushers, pooling their resources, will pay off enough laggards and other states to make the regime as effective (or as close to effective as their material predominance allows) as the US wants. This results from a simple consideration: the US will only commit just enough resources to the pool of side-payments so that the total pool is just big enough to achieve its preferred outcome (Ward *et al.*, 2001). On this basis we pay special attention to cases where the US was among the least progressive pushers.¹⁰ We code these as *usa_push* = 1 and all other cases 0. We also found that the US had the ability to prevent an effective regime emerging if it was an extreme laggard, in which case we code *usa_lag* = 1. We found no evidence that the US affected outcomes above and beyond what is accounted for by the contribution of its CINC score to group

totals when in other positions; nor did we find evidence that the specific position of any other major power mattered. In terms of our coding the US pushed in around 40 per cent of cases and lagged very infrequently (Table 1), which belies its reputation in some quarters. However, much of our data predates the US' movement away from multilateralism in the late 1980s and 1990s.

Social Capital. Above we argued that without adequate social capital, members of coalitions may fail to utilise their structural power. We suggested that a key dimension of social capital was trust fostered both by direct communication channels and through social networks linking coalition members. Given a valued network, *maxflow* is an appropriate measure of potential information flows between a pair of countries, because it takes into account not just direct links but also all indirect links between the pair of countries (Ford and Fulkerson, 1956). The underlying insight is that the denser the network and the higher the capacity of network links, the greater the potential for information to flow. This variable has been shown to be quite powerful in explaining conflict between countries (Dorussen and Ward, 2008; 2010). We consider links via the Intergovernmental Organisation (IGO) co-affiliation network and the international trade network.

We use the Correlates of War (COW) data on IGO membership (Pevehouse *et al.*, 2003).¹¹ This allows us to create a co-affiliation network where the value of the edge linking countries *i* and *j* is the number of IGOs of which they were both members in a particular year. For each case the IRD gives the earliest and latest date to which judgements about the regime component concerned refer. We took the midpoint year, which is justified because *maxflow* trends upwards almost linearly for a given pair of countries. Then we took the average value of *maxflow* across all dyads in the pusher coalition in this year. We normed this figure by the standard deviation of this variable across cases. We repeated this process for the laggard coalition.

Our approach to the IGO network raises some issues. It could be contended that environmental IGOs matter more to environmental issues, security IGOs to peace, etc. However, prior research suggests that it is the general possibilities for contact that matter most to environmental performance (Ward, 2006) and to peace (Dorussen and Ward, 2008). Some IGOs have bigger memberships than others, although all IGOs entering the COW data have at least three members. However, the transmission of information critical to making judgements about trust is likely to take place in informal *bilateral contact*, not in plenary sessions of IGOs; so the overall size of the IGO should not matter beyond the bilateral ties it creates. Although members of the IGOs on which we base calculations generally meet annually, the institutionalisation of some of them is relatively low. Recent research has attempted to count IGOs with relatively high degrees of institutionalisation, but the coding of frequency of meetings seems to overlap quite heavily with the criteria used by COW (Volgy *et al.*, 2008). We leave this dimension for future research. Given that there are some concerns about using the IGO network, it is fortunate that we can also draw on measures based on trade.¹²

Information flows between societies via international trade. Although governments participate directly in only a proportion of such trade, they learn from other traders. According to classical liberals, trade promotes peace because, for one thing, it aids mutual

understanding between nations; so we expect it to impact on trust. Following Han Dorussen and Hugh Ward (2008; 2010) we created a trade flow network where the value of the edge between i and j is total dyadic trade valued at constant prices. Using this network we repeated the calculation of the average value of normed *maxflow* for the pusher and laggard coalitions. We then summed the normed measures for the IGO and trade networks, to get *push_cap* and *lag_cap*. Finally we calculated $\text{diff_cap} = \text{push_cap} - \text{lag_cap}$. In summary *diff_cap* measures the difference in the average level of network connectivity between a dyad in the pusher coalition and a dyad in the laggard coalition, taking into account international diplomatic activity and trade flows. If it is positive, on average the pushers are better networked with each other than the laggards, and ought to be able to organise more effectively because, as a group, they have greater social capital. The measures we employ arguably do not capture all dimensions of social capital relevant to managing common property resources. For instance, epistemic networks linking states may well matter. However, we feel that our measures relate quite well to whether states can solve problems due to lack of trust on delivering what they promise.

Control Variables

Arild Underdal (2001b) finds that malignancy and uncertainty have an interactive impact on regime effectiveness. Malignancy concerns whether nations have strong incentives to free-ride. When uncertainty about the problem is high, malignancy will undercut cooperation. However, when uncertainty is low, malignancy is not necessarily such a problem. Following Helmut Breitmeier *et al.* (2011) who confirm that such an effect exists using the same data set that we employ (the IRD), we operationalise *malignancy* as the sum of two variables from the IRD: *interest_incompatibility*, reflecting whether nations' interests differ over the problem, measured on a six-point scale from very strong compatibility to very strong incompatibility; and *interest_disobey*, reflecting incentives to break agreements, measured on a five-point scale. We also followed by operationalising uncertainty by *problem_understand* which is a five-point scale from very strongly established understanding through to no understanding established.

On the basis of existing theory and case study evidence (Haas *et al.*, 1993; Miles *et al.* 2001; Young and Osherenko, 1993), other variables coded on the IRD might be relevant, related to: institutional capacity; asymmetries in nations' ability adversely to affect one another; concern over relative gains; background hostility; the degree to which states understand the problem and have information about the consequences of available courses of action; and the degree to which there is agreement about this. We included IRD variables as controls if they: (a) were causally prior to institutional features of the regime such as voting rules; (b) correlated strongly enough with the residuals from models including our key variables or correlated highly with one of our variables that was significant; (c) generated effects at or near conventional levels of significance; and (d) the direction of the effect could be comprehended on theoretical grounds. We found only two variables that consistently met these criteria: *known_consequences_options*, which captures how well states understood the consequences of the different problem-solving options, coded from (1) 'strongly established understanding' through to (5) for 'weakly established understanding'; and *power_setting_tension*, which captures the background relations between countries

involved in the regime, coded from (1) for 'very intense tension/hostility' through to 'general friendliness', which is coded (5).

On the IRD, coding of variables usually relates to problems and occasionally to the regime components intermediate between problem and regime levels. The properties of the 24 regimes are not coded directly. However, they could matter considerably to effectiveness because features of a regime can facilitate or retard collective action on the specific problems they span. For one thing, they may facilitate horse trading whereby states trade concessions over less salient problems to get what they want on problems of central interest. This argument suggests that we ought to do the best we can in the circumstances to control for regimes when modelling problems. We do this by including regime dummy variables, or fixed effects, in the model. That is, we model regime effects as intercept shifts due to unmeasured regime properties.

Statistical Models

Models are estimated using ordinary least squares (OLS).¹³ We found evidence for heteroskedasticity so we report standard errors clustered by regime.¹⁴ First, in Table 2 regression 1 we report a model including *predominance*, but not allowing for the conditioning impact of US involvement or social capital. As Hypothesis 1 suggests, *predominance* has a positive coefficient; however, it is not statistically significant at conventional levels. We found that *known_consequences_options* has a significant negative coefficient ($p < 0.05$) and *power_setting_tension* has a significant positive coefficient ($p < 0.1$). As expected, *malignancy* has a significant negative impact on *effectiveness* when *problem_understand* is zero (then we only need consider the coefficient on *malignancy*). Moreover, the coefficient on the interaction terms *problem_understandXmalignancy* (read our notation as *problem_understand* multiplied by *malignancy*) is positive and significant; so *problem_understand* significantly reduces the negative impact of *malignancy* on *effectiveness*.¹⁵ This conditioning effect is not significant when we control for US involvement and social capital, though.

We argued above that US involvement as a pusher conditions whether *predominance* matters. If this is so, to test Hypothesis 1 we need to allow both for pusher *predominance* and US involvement as a pusher. On theoretical grounds we also need to include the multiplicative interaction between these measures, *predominanceXusa_push* alongside *usa_push*. Coalition theories typically assume power is super-additive, that is, combining power held by two disjoint subgroups or two forms of power generates effects greater than the sum of the two bases of power operating on their own (Ordeshook, 1986, p. 313). From Table 2 regression 2, when *usa_push* = 0, *predominance* does not have a significant impact on *effectiveness*. However, when *usa_push* = 1, *predominance* has a significant positive impact. Allowing for the interaction, the coefficient on *predominance* and its 95 per cent confidence interval is shown in Figure 1 for the two relevant values of *usa_push*, 0 and 1. We also note from regression 2 that if *predominance* is zero, *usa_push* actually negatively impacts on *effectiveness* (then we only need consider the coefficient on *usa_push*). We can also note that if *usa_lag* = 1, regime effectiveness is significantly reduced, suggesting that the US has blocking power. However, this finding is not robust across alternative specifications of the model. We found no evidence for a similar synergistic interaction between *predominance* and a variable coding when any other major power occupied the role of the least

Table 2: Statistical Models for Effectiveness

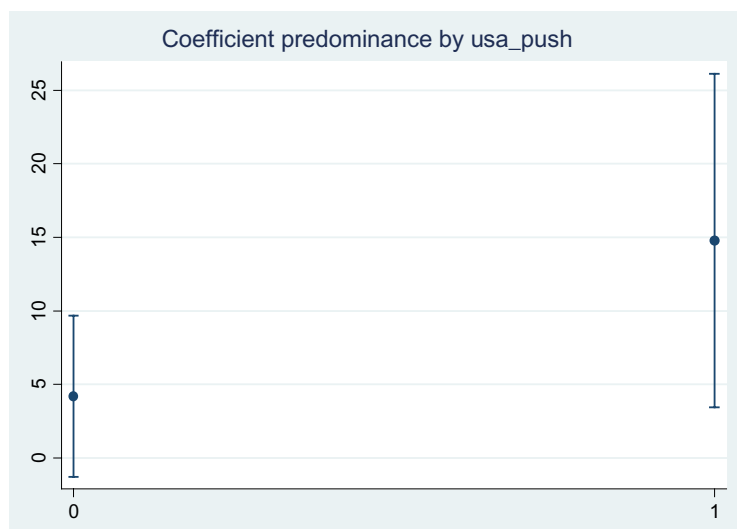
	(1)	(2)	(3)
predominance	4.838 (1.55)	4.198 (1.50)	4.465 (1.13)
known_consequences_options	-2.507 (2.26)**	-2.833 (2.58)**	-2.970 (3.21)***
power_setting_tension	1.469 (1.87)*	1.485 (1.53)	0.833 (0.83)
problem_understand	-2.383 (2.34)**	-1.223 (1.30)	-1.193 (1.51)
malignancy	-1.131 (2.74)**	-0.690 (1.73)*	-0.885 (2.61)**
problem_understandxmalignancy	0.288 (1.95)*	0.122 (0.86)	0.180 (1.45)
usa_push		-2.714 (2.16)**	-4.016 (4.20)***
usa_pushxpredominance		10.582 (2.26)**	23.311 (3.94)***
usa_lag		-1.971 (2.09)*	-1.604 (1.16)
diff_cap			-0.078 (0.36)
predominancexdiff_cap			-0.026 (0.02)
usa_pushxdiff_cap			-0.418 (1.46)
usa_pushxpredominancexdiff_cap			7.337 (2.70)**
Constant	8.336 (2.75)**	5.690 (1.89)*	9.138 (1.78)*
Observations	117	117	117
R-squared	0.53	0.56	0.59

Notes: Robust t-statistics in parentheses:

*significant at 10%; **significant at 5%; ***significant at 1%. Regime fixed effects not reported.

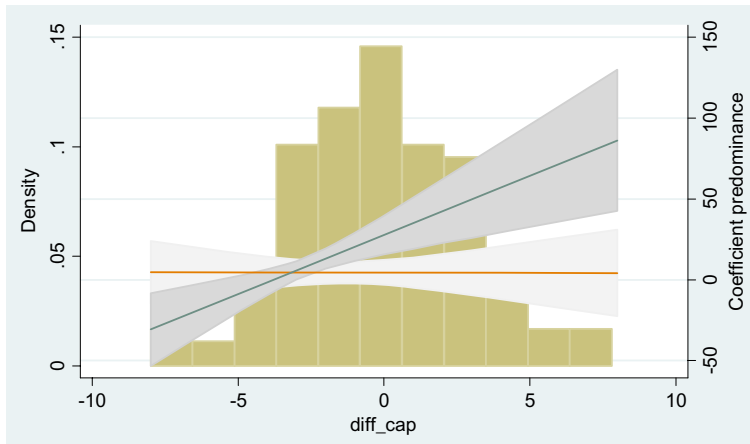
progressive among the pushers. Nor did we find that other major powers in general had a significant blocking role as laggards.

Table 2 regression 3 considers the conditioning effect of social capital on predominance. In order to test Hypothesis 2 we need to consider the three-way interaction between structural power, US involvement as a pusher and the distribution of social capital across pushers and laggards. This is because we already have reason to believe from regression 2 that the effect of *predominance* is conditioned by whether the US is a pusher; and just considering

Figure 1: The Conditioning Effect of US Involvement on the Impact of Predominance

a two-way interaction between social capital and predominance would not allow for possible mediation of the relationship between predominance and US leadership social capital. Yet we can expect such an effect because the US and its allies need to trust each other. Thus regression 3 includes $\text{predominance} \times \text{diff_cap}$, $\text{usa_push} \times \text{diff_cap}$ and the three-way interaction $\text{usa_push} \times \text{predominance} \times \text{diff_cap}$. It is not easy to interpret coefficients and significance levels with three-way interactions by reading tables, so we present results graphically in Figure 2. In the background there is a histogram showing the density of diff_cap , which is roughly normally distributed with mean close to zero. Its density is measured on the left-hand y-axis. The figure also shows how the coefficient on predominance , measured on the right-hand y-axis, changes with increases in diff_cap for $\text{usa_push} = 0$ (red line) and $\text{usa_push} = 1$ (green, positively sloped line). It also shows 95 per cent confidence intervals for the coefficient on predominance for $\text{usa_push} = 0$ (lighter grey-scale) and $\text{usa_push} = 1$ (darker grey-scale). We see that when $\text{usa_push} = 0$ the confidence interval always includes zero, that is, predominance is never significant for any level of diff_cap . Moreover, it hardly changes with diff_cap . However, when $\text{usa_push} = 1$ predominance has a significant positive relation with effectiveness at the 95 per cent level as long as diff_cap is greater than around -2 . For most values of diff_cap likely to be observed empirically, predominance will significantly increase effectiveness . When $\text{usa_push} = 1$, the coefficient on predominance increases with diff_cap , which supports Hypothesis 2 – that predominance matters to effectiveness so long as the pusher coalition is not relatively disabled in its ability to mobilise by relative lack of trust among its members. A formal test of the hypothesis that diff_cap significantly and positively impacts on the coefficient on predominance when $\text{usa_push} = 1$ supports the visual evidence.¹⁶

Figure 2: The Conditioning Effect of the Difference in Social Capital between Pushers and Laggards on Predominance



Our conclusion is that pusher predominance is not sufficient unless the US exerts leadership, too. But it must also be the case that the pusher coalition can mobilise its structural advantage because members trust each other not to renege on agreements to make side-payments and to act on the problem themselves. While some might regard it as obvious that US power matters, it is not at all obvious that it is insufficient on its own to get what the US wants in the environmental domain, or that trust is a vital factor for mobilising structural advantage.

Robustness Tests

In summary, we find that the structural power advantage of the pusher coalition does help to generate a more effective regime, but only when the US is involved as a pusher and to the extent that the pusher coalition can actually mobilise its advantage in structural power. We now test the robustness of these conclusions.

Countries lacking hard power may derive bargaining advantage over environmental issues because their actions are a key to solving the problem (Chasek *et al.*, 2010), so they have ‘power to destroy’ (Downie, 1999). Although *predominance* allows for hard structural power, it could be argued that this form of issue-specific power needs to be considered too. The IRD variable *power_setting_symmetry* captures the degree to which such issue-specific power is symmetrically distributed. When added to regression 3 in Table 1 it is not significant and our conclusions are robust.¹⁷ This is not to say that the power to block is unimportant. We interpret this result as an indication that side-payments are used to buy out veto power, so this variable does not matter to effectiveness once we control for predominance in making side-payments.

The IRD includes information on who coded what. One way of addressing potential problems with inter-coder reliability across regimes (mentioned above) is to include dummy variables for the first and (if present) second coder of each problem. Very few of

these dummy variables are significant when added to regression 3 Table 1, their inclusion makes little substantive difference and our conclusions are robust.¹⁸

The IRD deals with various sorts of goods, the categories being collective (or public) good, common-pool resources, shared natural resources, common-pool/shared natural resources and transboundary externalities. The issue is whether non-excludability holds in all cases, because this is assumed by our theoretical approach. Coding rules specify that shared resources are not necessarily common pool, though common-pool resources do exhibit non-excludability. Only one problem is coded this way on the IRD: water pollution in the Rhine in the period 1963–98. Although we believe this is a miscoding, as there clearly is a public good issue here, for the sake of argument we will see what consequences if any arise. We also need to consider externalities. Some of these are two-way (or multi-way), such as fluxes of air pollution across borders. Here there is non-excludability from the benefits of eliminating externalities. However, some externalities are asymmetric, such as when an upstream nation pollutes. The IRD makes it hard to identify such cases specifically, although it provides some relevant information.¹⁹ Conservatively we see what happens when we exclude both the single case of a shared resource and all cases coded as involving externalities. When we do this our conclusions are robust.²⁰

Some cases involve regional problems in Europe or in other parts of the world. It might be argued that cases where the US could not conceivably be involved should not be used to estimate the effect of US leadership or the way it interacts with pusher predominance, because this is to conflate cases where the US *chose* not to be involved with cases where it *could* not be involved. In general it is quite hard to distinguish cases where the US could have been involved but chose not to from cases where it could not even if it had desired to do so: many regional regimes between poorer countries are ‘underwritten’ by the US signing associated treaties, or may involve the US playing a role in negotiations. As an example of ambiguity, the US signed the Convention of Long-Range Transboundary Air Pollution, initially focused on sulphur dioxide pollution in Europe, although a separate bilateral treaty with Canada actually governed its attempts to deal with transboundary flows of this pollutant. Despite ambiguities, our conclusions are robust to dropping the 26 cases that we coded as excluding potential US involvement.²¹

Just because members of a group are well networked, this does not necessarily imply that they agree with each other. However, it is possible that our measures of social capital proxy for preference similarity in a way not controlled for by locating countries in the pusher or laggard coalitions. For each dyad in the pusher coalition we took Curtis Signorino and Jeffrey Ritter’s (1999) coefficient of agreement based on voting in the UN General Assembly, averaging over the years covering the regime component concerned. We then averaged these scores over all dyads in the pusher coalition to get an overall agreement score, p_srsvvs .²² We calculated a similar score for the laggard coalition l_srsvvs . Correlations between these variables and our measures of social capital suggest they are measuring different things.²³ When added to the model in regression 3 Table 1 only l_srsvvs proved to be significant; and its coefficient is negative; so prior agreement among the laggard coalition harms effectiveness. However, our conclusions are robust to the inclusion of l_srsvvs .²⁴

Conclusion

Our theoretical arguments and empirical analysis suggest that the relationship between the exercise of structural power by groups of pushers and laggards and environmental regime effectiveness are complex. Predominance of the coalition of pushers in terms of structural capital only makes a difference to environmental regime effectiveness if the group includes the US. On the other hand, the US on its own cannot improve regime effectiveness by exercising structural power. These results confirm our theoretical expectations and provide large-*n* evidence that structural power matters. They also pose a serious question for policy makers in issue areas in which the US has been considered a laggard, such as climate change. They suggest that it will be difficult for European countries to ignore the US and employ their own structural power to achieve a more effective climate regime.

Our theoretical expectations are also confirmed with respect to social capital. When the US is a pusher, whether or not predominance has a positive impact on effectiveness depends on how well networked pushers are compared to laggards. If laggards are better networked, predominance may not have a significant effect. An important implication of this finding is that it is not just the existence of international social capital that matters to international collective action as has often been assumed (Ward, 2006) but how that social capital is distributed across groups and the way it interacts with power. Our research illuminates one way in which international social capital matters, but its effects probably go beyond those related to information flow and trust. Its impact on norm diffusion and changing states' perceptions of fundamental interests also needs to be disentangled in future research.

(Accepted: 1 February 2013)

(Published online: 17 June 2013)

About the Authors

Frank Grundig is Lecturer in International Relations in the School of Politics and International Relations at the University of Kent at Canterbury. He conducts research and has published numerous articles on the effects and effectiveness of international institutions. His latest project is concerned with the effects of international institutional activities on domestic politics. Frank Grundig, School of Politics and International Relations, Rutherford College, University of Kent, Canterbury CT7 2NX, UK; email: f.grundig@kent.ac.uk

Hugh Ward is a Professor in the Department of Government at the University of Essex and Co-editor of the *British Journal of Political Science*. Currently his main research interests are comparative and international environmental politics. In recent years he has also applied social network analysis at scales from local politics in the UK through to international conflict. Hugh Ward, Department of Government, University of Essex, Wivenhoe Park, Colchester, Essex CO4 3SQ, UK; email: hugh@essex.ac.uk

Notes

- 1 Some accounts of leadership focus on how individuals convert structural power into bargaining leverage (e.g. Young, 1991). We focus on the structural element and the 'fundamental forces' that shape outcomes (Barrett, 2003, p. 145).
- 2 Dreher *et al.* (2009) find that non-permanent members of the Security Council have an increased chance of receiving World Bank loans.
- 3 Some components are periods between watersheds in regimes, giving what might be regarded as repeated observations on the same component; others are treaties within regimes, so that there are not meaningful repeated observations. This precludes modelling the data as a pooled cross-section/time series. Multi-level modelling is precluded by lack of coding of regimes as distinct from components.
- 4 In some instances we recoded before averaging because original codings in the IRD did not follow the natural ordinal sequence suggested by theory, so that averaging would otherwise have given meaningless results.
- 5 Downs *et al.* (1996) point out that conformity to regime rules and norms is quite often high because the regime is designed to reflect what countries would do anyway. Besides being endogenous, conformity can be high for regimes that have little – or even a negative – effect on outcomes.

- 6 For some preliminary empirical results see Online Appendix Table S3.
- 7 Online Appendix Table S1 presents bivariate correlations.
- 8 Data on capability scores were downloaded from EUGene, <http://www.eugenesoftware.org> [Accessed 10 August 2007] (Bennett and Stam, 2000).
- 9 An issue that arises is how to treat the EU. Although the EU has had clear legal powers to represent its members in international environmental negotiations since the Maastricht Treaty, and plays a major role in relation to climate change, many of the cases here predate this; and in some domains such as CITES other countries have resisted EU intrusion. We decided not to code the EU as a major power.
- 10 Specifically cases where the US was a pusher or extreme pusher and no other major power was a pusher if the US was an extreme pusher.
- 11 A small proportion of the IGOs in the COW data set (on the authors' estimate under 3 per cent) are directly implicated in regimes covered by the IRD, an example being the International Whaling Commission. We do not exclude these from calculations partly because it makes almost no difference to our measures when we exclude suspicious IGOs in this regard and partly because there is no reason to suppose that such IGOs are not places where information about a nation's *general* reputation for trustworthiness cannot be transmitted. It is this reputation that is our concern.
- 12 Over all the dyads relevant to the calculations here the correlation between maxflow measured on the IGO and trade networks was 0.547 ($n = 468$).
- 13 The dependent variable, *effectiveness*, is calculated by multiplying together the ordinal variables *problem_change* and *problem_change_causal*, both measured on a five-point scale. Thus the dependent variable is an ordinal variable measured on a 25-point scale. As it is not continuous, there might be problems estimating models using OLS. However, in practice re-estimating models using ordered logit makes little substantive difference. For instance, Online Appendix Table S2 regression A1 re-estimates Table 1 regression 3 using ordered logit. Because ordered logit is a non-linear model interpretation of coefficients is somewhat less intuitive than linear OLS, so we stick to reporting estimates using the latter in the main text.
- 14 There was no evidence for high-leverage outliers affecting the results.
- 15 We found some evidence for a non-linear relationship between effectiveness and the average real GDP per capita of countries involved, with effectiveness increasing with low average levels; coefficients approaching significance at the 90 per cent level. This is the opposite of theoretical expectations based on the 'Environmental Kuznets Curve' approach.
- 16 Consider the model

$$Y = b_0 + b_1X + b_2Z + b_3W + b_4XZ + b_5XW + b_6ZW + b_7XZW + b_8\text{Controls} + \epsilon$$

Here

$$dy/dx = b_1 + b_4Z + b_5W + b_7ZW.$$

And

$$dy/dxdz = b_4 + b_7W$$

so the test of whether Z significantly mediates the relationship between Y and X is a test of the null hypothesis $b_4 + b_7W = 0$. Here Y is *effectiveness*, X is *predominance* and Z is *diff_cap*. W is a dummy, *usa_push*. So when $W = 0$, all we need to do is to look at the *t*-test on b_4 . Here b_4 , the coefficient on *predominanceXdifff_cap* is not significant; so there is no significant mediating effect when the US is not involved. On the other hand when the US is involved, the null is $b_4 + b_7 = 0$. The Wald test for this is

$$F(1, 20) = 12.38$$

$$\text{Prob} > F = 0.0022$$

so we can reject the null that pusher *diff_cap* has no mediating effect on *predominance*.

- 17 See Online Appendix Table S2 regression A2.
- 18 See Online Appendix Table S2 regression A3, which reports the significant coder dummies.
- 19 *Causers_affected_compare* codes whether the countries especially important in causing the problem are the same as those experiencing the bulk of the suffering, but this does not completely rule out two-way effects.
- 20 See Online Appendix Table S2 regression A4.
- 21 We coded the transboundary air pollution regime as potentially involving the US. See Online Appendix Table S2 regression A5.
- 22 Specifically we used the variable *srsrvs*, based on unweighted squared distance in the voting data, from Häge's (2011) data set.
- 23 The correlation between *push_cap* and *p_srsrvs* is -0.074 ($n = 118$) and that between *lag_cap* and *l_srsrvs* is actually negative at -0.498 .
- 24 See Online Appendix Table S2 regression A6.

References

- Barrett, S. (2003) *Environment and Statecraft: The Strategy of Environmental Treaty-Making*. Oxford: Oxford University Press.
- Barrett, S. (2007) *Why Cooperate: The Incentives to Supply Global Public Goods*. Oxford: Oxford University Press.
- Bennett, D. S. and Stam, A. (2000) 'Eugene: A Conceptual Manual', *International Interactions*, 26 (2), 179–204.
- Bernaer, T. and Siegfried, T. (2008) 'Compliance and Performance in International Water Agreements: The Case of the Naryn/Syr Darya Basin', *Global Governance*, 14 (4), 479–501.
- Bernaer, T., Kalbhenn, A., Koubi, V. and Spilker, G. (2010) 'A Comparison of International and Domestic Sources of Global Governance Dynamics', *British Journal of Political Science*, 40 (3), 509–38.
- Bodin, O. and Crona, B. I. (2009) 'The Role of Social Networks in Natural Resource Governance: What Relational Patterns Make a Difference?', *Global Environmental Change*, 19 (3), 366–74.

- Breitmeier, H., Young, O. R. and Zürn, M. (2006) *Analyzing International Environmental Regimes: From Case Study to Database*. Cambridge MA: MIT Press.
- Breitmeier, H., Underdal, A. and Young, O. R. (2011) 'The Effectiveness of International Environmental Regimes: Comparing and Contrasting Findings from Quantitative Research', *International Studies Review*, 13 (4), 579–605.
- Brondizio, E. S., Ostrom, E. and Young, O. R. (2009) 'Connectivity and the Governance of Multilevel Social-Ecological Systems: The Role of Social Capital', *Annual Review of Environment and Resources*, 34, 253–78.
- Chasek, P. S., Downie, D. L. and Welsh-Brown, J. (2010) *Global Environmental Politics*, fifth edition. Boulder CO: Westview Press.
- Coleman, J. S. (1994) *Foundations of Social Theory*. Cambridge MA: Harvard University Press.
- Dorussen, H. and Ward, H. (2008) 'Intergovernmental Organizations and the Kantian Peace: A Network Perspective', *Journal of Conflict Resolution*, 52 (2), 189–212.
- Dorussen, H. and Ward, H. (2010) 'Trade Links and the Kantian Peace: A Network-Theoretic Approach to Communication, Inter-cultural Understanding, and Conflict', *Journal of Peace Research*, 47 (1), 29–42.
- Downie, D. (1999) 'The Power to Destroy: Understanding Stratospheric Ozone Politics as a Common Pool Resource Problem', in J. S. Barkin and G. Shambaugh (eds), *Anarchy and the Environment: The International Relations of Common Pool Resources*. Albany NY: State University of New York, pp. 97–121.
- Downs, G. W., Locke, D. M. and Barsoom, P. N. (1996) 'Is the Good News about Compliance Good News about Cooperation?', *International Organization*, 50 (3), 379–406.
- Dreher, A., Sturm, J.-E. and Vreeland, J. R. (2009) 'Development Aid and International Politics: Does Membership of the UN Security Council Influence World Bank Decisions?', *Journal of Development Economics*, 88 (1), 1–18.
- Ford, L. R. and Fulkerson, D. R. (1956) 'Maximal Flow through a Network', *Canadian Journal of Mathematics*, 9 (2), 210–8.
- Gilpin, R. (1987) *The Political Economy of International Relations*. Princeton NJ: Princeton University Press.
- Grundig, F. (2009) 'Political Strategy and Climate Policy: A Rational Choice Perspective', *Environmental Politics*, 18 (5), 747–64.
- Haas, P. M., Keohane, R. O. and Levy, M. A. (eds) (1993) *Institutions for the Earth: Sources of Effective International Environmental Protection*. Cambridge MA: MIT Press.
- Hafner-Burton, E. M. and Montgomery, A. H. (2006) 'Power Positions: International Organizations, Social Networks, and Conflict', *Journal of Conflict Resolution*, 50 (1), 3–27.
- Hafner-Burton, E. M., Kahler, M. and Montgomery, A. H. (2009) 'Network Analysis for International Relations', *International Organization*, 63 (3), 559–92.
- Häge, F. M. (2011) 'Choice or Circumstance? Adjusting Measures of Foreign Policy Similarity for Chance Agreement', *Political Analysis*, 19 (3), 287–305.
- Helm, C. and Sprinz, D. (2000) 'Measuring the Effectiveness of International Environmental Regimes', *Journal of Conflict Resolution*, 44 (5), 630–52.
- Hovi, J., Sprinz, D. and Underdal, A. (2003) 'The Oslo-Potsdam Solution to Measuring Regime Effectiveness', *Global Environmental Politics*, 3 (3), 74–95.
- Hovi, J., Sprinz, D. and Underdal, A. (2009) 'Implementing Long-Term Climate Policy: Time Inconsistency, Domestic Politics, and International Anarchy', *Global Environmental Politics*, 9 (3), 20–39.
- Ishihara, H. and Pascual, U. (2009) 'Social Capital in Community Level Environmental Governance: A Critique', *Ecological Economics*, 68 (5), 1549–62.
- Keck, M. and Sikkink, K. (1998) *Activists beyond Borders*. Ithaca NY: Cornell University Press.
- Keohane, R. O. (1980) 'The Theory of Hegemonic Stability and Changes in International Regimes, 1967–1977', in O. R. Holsti, A. L. George and R. M. Siverson (eds), *Change in the International System*. Boulder CO: Westview Press, pp. 132–62.
- Keohane, R. O. (1984) *After Hegemony*. Princeton NJ: Princeton University Press.
- Kindleberger, C. P. (1973) *The World in Depression: 1929–1939*. London: Allen Lane.
- Kydd, A. H. (2007) *Trust and Mistrust in International Relations*. Princeton NJ: Princeton University Press.
- Lake, D. (1993) 'Leadership, Hegemony, and the International Economy: Naked Emperor or Tattered Monarch with Potential?', *International Studies Quarterly*, 37 (4), 459–89.
- McKeown, T. (1991) 'A Liberal Trading Order? The Long-Run Pattern of Imports to the Advanced Capitalist States', *International Studies Quarterly*, 35 (2), 151–71.
- Mansfield, E. D. (1992) 'The Concentration of Capabilities and International Trade', *International Organization*, 46 (3), 731–64.
- Maoz, Z., Kuperman, R. D., Terris, L. G. and Talmud, I. (2006) 'Structural Equivalence and International Conflict: A Social Networks Analysis', *Journal of Conflict Resolution*, 50 (5), 664–89.
- Miles, E., Underdal, A., Andresen, S., Wettstad, J., Skjaereth, J. B. and Carlin, E. M. (eds) (2001) *Environmental Regime Effectiveness: Confronting Theory with Evidence*. Cambridge MA: MIT Press.
- Norrlöf, C. (2010) *America's Global Advantage: US Hegemony and International Cooperation*. Cambridge: Cambridge University Press.
- Ordeshook, P. C. (1986) *Game Theory and Political Theory*. Cambridge: Cambridge University Press.
- Ostrom, E. and Ahn, T. K. (2008) 'The Meaning of Social Capital and Its Links to Collective Action', in G. T. Svendsen and G. L. Svendsen (eds), *The Handbook of Social Capital*. Northampton MA: Edward Elgar, pp. 17–35.
- Pahre, R. (1999) *Leading Questions: How Hegemony Affects the International Political Economy*. Ann Arbor MI: University of Michigan Press.
- Paterson, M. (2009) 'Post-hegemonic Climate Politics?', *British Journal of Politics and International Relations*, 11 (1), 145–58.

- Pevehouse, J., Nordstrom, T. and Warnke, K. (2003) *Intergovernmental Organizations, 1815–2000: A New Correlates of War Data Set*. Available from: <http://cow2.la.psu.edu/> [Accessed 5 July 2006 (Version 2.1)].
- Pretty, J. and Ward, H. (2001) 'Social Capital and the Environment', *World Development*, 29 (2), 209–27.
- Siegel, D. A. (2009) 'Social Networks and Collective Action', *American Journal of Political Science*, 53 (1), 122–38.
- Signorino, C. S. and Ritter, J. M. (1999) 'Tau-B or Not Tau-B: Measuring the Similarity of Foreign Policy Positions', *International Studies Quarterly*, 43 (2), 115–44.
- Skjaereth, J. B. and Wettestad, J. (2009) 'The Origin, Evolution and Consequences of the EU Emissions Trading System', *Global Environmental Politics*, 9 (2), 101–23.
- Skodvin, T. and Andresen, S. (2006) 'Leadership Revisited', *Global Environmental Politics*, 6 (3), 13–27.
- Snidal, D. (1985) 'The Limits of Hegemonic Stability Theory', *International Organization*, 39 (4), 579–614.
- Sprinz, D. and Vahtoranta, T. (1994) 'The Interest-Based Explanation of International Environmental-Policy', *International Organization*, 48 (1), 77–105.
- Tallberg, J. (2008) 'Bargaining Power in the European Council', *Journal of Common Market Studies*, 46 (3), 685–708.
- Taylor, M. (1987) *The Possibility of Cooperation*. Cambridge: Cambridge University Press.
- Underdal, A. (1992) 'The Concept of Regime Effectiveness', *Cooperation and Conflict*, 27 (3), 227–40.
- Underdal, A. (1994) 'Leadership Theory: Rediscovering the Arts of Management', in I. W. Zartman (ed.), *International Multilateral Negotiation: Approaches to the Management of Complexity*. San Francisco CA: Jossey-Bass, pp. 178–97.
- Underdal, A. (2001a) 'Conclusions', in E. Miles, A. Underdal, S. Andresen, J. Wettestad, J. Skjaereth and E. Carlin (eds), *Environmental Regime Effectiveness: Confronting Theory with Evidence*. Cambridge MA: MIT Press, pp. 433–65.
- Underdal, A. (2001b) 'One Question, Two Answers', in E. Miles, A. Underdal, S. Andresen, J. Wettestad, J. Skjaereth and E. Carlin (eds), *Environmental Regime Effectiveness: Confronting Theory with Evidence*. Cambridge MA: MIT Press, pp. 3–45.
- Vogel, D. (1997) 'Trading Up and Governing Across: Transnational Governance and Environmental Protection', *Journal of European Public Policy*, 4 (4), 556–71.
- Volgy, T. J., Fausett, E., Grant, K. A. and Rogers, S. (2008) 'Identifying Formal Intergovernmental Organizations', *Journal of Peace Research*, 45 (6), 849–62.
- Ward, H. (2006) 'International Linkages and Environmental Sustainability: The Effectiveness of the Regime Network', *Journal of Peace Research*, 43 (2), 149–66.
- Ward, H., Grundig, F. and Zorick, E. R. (2001) 'Marching at the Pace of the Slowest: A Model of International Climate Negotiations', *Political Studies*, 49 (3), 438–61.
- World Development Movement (2011) 'The End Game in Durban? How Developed Countries Bullied and Bribed to Try to Kill Kyoto'. Available from: <http://www.wdm.org.uk/sites/default/files/Bullying%20%26%20bribery.pdf> [Accessed 13 May 2013].
- Young, O. (1991) 'Political Leadership and Regime Formation: On the Development of Institutions in International Society', *International Organization*, 45 (3), 281–308.
- Young, O. and Osherenko, G. (1993) 'International Regime Formation: Findings, Research Priorities, and Applications', in O. Young and G. Osherenko (eds), *Polar Politics: Creating International Environmental Regimes*. Ithaca NY: Cornell University Press, pp. 223–61.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Table S1: Bivariate Correlations Main Variables (n=117)

Table S2: Robustness of Regression 3 Table 1 (in text)

Table S3: Alternative Conceptions of Effectiveness

Figure S1: The Conditioning Effect of diff_cap on the Coefficient on Predominance (from Table S3 Regression 1)